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ABSTRACT

The form box is an instructional material appropriate for screening children (2-5 years old) for perceptual learning disabilities, creating individual learning experiences, and developing cognitive processes and strategies. (DB)

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The role of structured educational materials in the identification of perceptual problems in preschool children.

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The role of structured educational materials in the identification of perceptual problems in preschool children.

Donna White

The purpose of this paper is to discuss some of the issues involved in early identification and to illustrate aspects of these issues with data that has been collected on one educational material, a form box. To many parents and educators, a form box--like puzzles, water play, or montessori materials--is a toy. It is easy to dismiss "toys" and "playing" as having little relevance in academic programmes. My position is that such materials if well designed, understood, and properly used can play an important role in developing skills prerequisite to reading including the ability to attend to a task and organize its solution.

The form box was selected for study because it is familar and available to parents and preschool teachers and seemed appropriate for use with three to five year old children (Gordon, White, & Diller, 1972). Also, it is a visual perceptual task and as Barrett (1965) noted visual perception has nearly universal acceptance as an index of reading readiness. By selecting the form box, I did not mean to imply that it is more acceptable as part of a curriculum than structured equipment requiring other skills or than less directed, explor--atory materials. It represents one type of cognition which is

dependent on visual discrimination of form and orientation. Logically it might be related to later ability to differentiate confusing letters and words. It also requires the child to organize his behavior and attend to a task.

Although available in many versions, our task was simply a wooden box with five differently shaped holes cut in the top. Thirteen three dimensional forms of five shapes came with the box. The forms included a cylinder, cube, rectangular shape, pyramid, and u-shaped solid. Each of these forms fit into only one hole of the corresponding shape. However, the lid of the box was hinged and could be lifted.

When is early?

The first issue I would like to raise is: when is early. A review of the literature indicates that for many educators and researchers early is equated with kindergarten. While this may be understandable in view of our educational tradition of beginning school at five or six years, it is difficult to defend in light of research during the past thirty years. We have all become increasingly aware of the fact that the preschool years are of great importance in cognitive as well as social and emotional development. It is possible to illustrate the early development of visual-perceptual-cognitive skills with the form box.

This task was administered to all children in our two laboratory schools. The teachers introduced the task by sitting at a table with the box in view of the children and allowing them to approach individually during their free play period. Each child was asked to put the forms into their "right" holes. The teacher recorded each move the child made: correct responses; form errors (putting a form into the wrong hole); orientation errors (putting a form such as the pyramid into the triangular hole but turning it incorrectly so that it did not fit in); lid responses (opening the lid and dropping the forms inside).

Figure 1* shows the average number of trials needed to complete the form box for 114 children aged two to five years. As can be seen from Figure 1* , the ability to discriminate forms and deal with orientation of three dimensional solids is a skill which develops in the preschool years. A one way analysis of variance ($F = 10.638$; df 3, 110; $p < .001$) confirms the significance of the increase in these skills with age.

The fact that children develop the perceptual and cognitive skills to deal with the form box during their preschool years must be considered along with the results of many other studies such as those by Piaget (1950;1969), Bloom (1964) and Kagan (1976). Taken together this research illustrates the importance of the prekindergarten years in development. Children come to kindergarten competent

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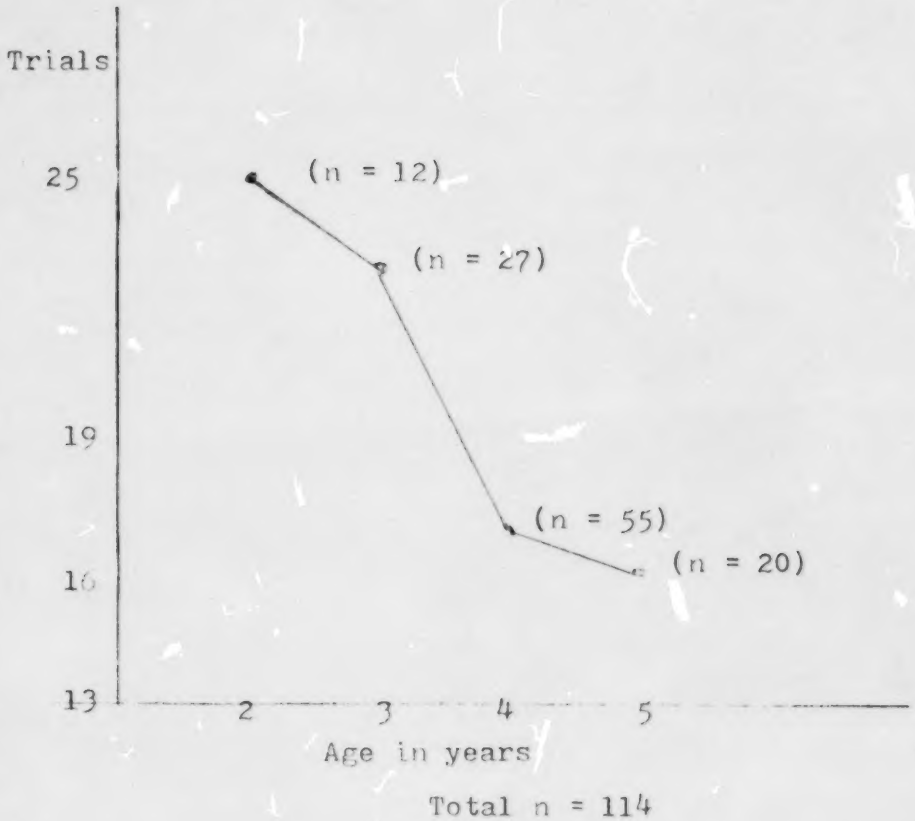
*see page 4

Figure 1. Mean number of trials required to complete the form box as a function of age.



Total n = 114

or lacking skills in a number of areas. Early identification should not be limited to kindergarten but should include the preschool years if one is to optimize the chance of ameliorating difficulties that could lead to later learning problems.

What is identification?

Adelman and Feshbach (1975) have pointed out the need to distinguish between prediction and identification. Prediction involves making statements about whether learning problems will occur at some future time. The literature contains many predictive studies* which can boast low, but statistically significant correlations between readiness skills and reading achievement. While such correlations give us information about variables which may affect achievement, they do not tell us anything about the functioning and learning needs of an individual child. On the other hand, identication is defined as assessment of a child's current functioning by comparing his performance with that of other children of similar ages and backgrounds. The potential for early identification exists in the preschool and has some advantages and some disadvantages when compared to alternative methods of assessment such as the psychometric evaluation of intelligence. For example, what was needed to turn the form box from a toy into an assessment material was systematic observation of children and the development

*A bibliography of these studies is available on request.

of some expectancies about age related performance. While I am not suggesting that teachers and parents should immediately begin research with their children, I do think it is unfortunate that perceptual, language, intellectual, and cognitive development have not been studied in a way that makes data available to teachers and parents. Good teachers quickly learn "what most kids can do", but have failed to objectify and verify their impressions. Intelligence tests have excellent normative data but are accessible only to psychologists. Often the results of such tests are not effectively communicated to teachers and parents. Toy manufacturers may take an educated guess as to the appropriate age level of many of their products but how many of us have had the exper--ience of buying a puzzle or toy labeled three to six years which provided endless frustration for our five year old. The data presented on the form box is significant because it shows that materials commonly found in homes and preschools can be used to assess current functioning--to identify current problems. Such assessments of individual children can be made without disruption of programmes. Informal observation of young children with a variety of materials suggests that similar results could be obtained in many situations.

Creating individual learning experiences

Perhaps more important than assessment based on normative data is the fact thatmaterials such as the form box have the advantage of being related to skills often

incorporated in preschool programmes. The type of error a child makes on the form box can lead directly to class--room activities designed to improve the skill. If the child cannot discriminate forms, simpler form problems, play experiences involving the manipulation of forms or tasks involving the labeling of forms can be introduced. Tasks can be presented in order of increasing difficulty. Specific activities can often be found by analyzing materials already in the classroom or devising materials. If orientation errors abound, different activities are warrented. Careful examination of the preschool class - room, home, toy catalogues together with careful analysis of the demands of each task can produce a flexible curriculum which can be individualized by guiding the children to those materials which provide optimal matches between current functioning and challenge. Intellectual evaluations have often been criticized for failing to provide such information.

The activity described as task analysis is an essential role of the teacher. When the traditional preschool programme came under fire during the sixties, educators were criticized for their failure to be explicit about how they based a cognitive-developmental curriculum upon play. Biber (1969) noted that there was in response to these criticisms a tendency to reject all past theory and practice in favor of accepting limited innovations which often promised unrealistic remedies.

Although some balance has been restored, there has certainly been a recent increase in the marketing of early childhood kits which offer to fill the assessment and programme development roles for the teacher. Basically, the kits outline several "test" areas and then provide remedial activities for children dependent on test scores. While such kits may provide good starting points or supplements to a preschool programme, several cautions are advisable. Kits are usually developed with specific goals in mind (e.g. reading) and therefore do not include a full range of tasks. Kits should be carefully examined to ensure that some research has been done in developing norms and that some test of the effects of using the kit is available. Finally, most kits emphasize competence or skill development (test scores) and do not deal with the qualitative aspects of learning and teaching. How children organize their own performances is still a highly intuitive dimension which must be responded to and guided by teachers.

Cognitive processes and strategies

The experimental-testing tradition has been so dominant in psychology in recent years that little research has been done on process or style. Currently, this emphasis is changing and observations of qualitative processes are considered respectable. I would like to describe some of our impressions regarding the strategies used by preschool children in completing the form box. A sample

of our children were videotaped using the form box. These tapes were then studied to see what coping strategies could be defined. I would simply like to describe some of our observations. First, we observed that young children do not select forms in a random order. Quite often a child will select similar shapes in groups and many children actually progressed from selecting the easier shapes (circles, squares) to the more difficult shapes (those requiring orientation such as the triangle and u-shaped solid). Even as early as two years of age, children analyzed the problem before they began to work. They seemed to make an assessment such as these are easy or I know these versus these I don't know. This assessment was dramatic in the case of some two year old children who selected the circles and cubes, placed them correctly and easily and then without even attempting the other forms, lifted the lid and threw them inside the box.

A definite sequence of looking at the forms, scanning the holes in the box lid, trying the forms, and presolution was observed especially with regard to orientation of forms. Children who made fewest orientation errors generally presolved. They looked at the form, looked at the box lid, turned the form in their hand, and then placed it in the hole correctly oriented. The process is similar to that described by White, Castle, and Held in the development of visually directed reaching in infants.

Competent children who utilized trial and error placed the form right against the hole in the box, then slowly and systematically turned the form until it fit. They did not seem to require the teacher to intercede and demonstrate placement of forms and some children showed resentment if she did this. They responded well to verbal support and encouragement such as "you've got it in the right hole and you're turning it to see how it fits".

Finally, I would like to mention the role of verbal behavior in this visual perceptual task. Most of our young children did not make task relevant verbal responses while working. The most common verbalization was for children to label the forms calling them by their shape or the u-shaped piece, a car. Some children reinforced their own responses saying "that's right" or "I got it" when they made a correct response. A few children actually overtly guided their performance with verbal responses--telling themselves what form to pick up next and where to put it. Such verbalizations raise the question of whether competent children routinely label, reinforce, and guide their performances covertly.

There are a great many things we do not know about the way children think about and organize problem solving. It is impressive to me that children possess the ability to stop, look, listen, size up, and systematically explore as well as verbally reinforce and direct their behavior at early ages. Whether all children can or do utilize these

these abilities and under what conditions is a relatively unexplored area. It seems almost ludicrous to discuss early identification and teaching with reference only to skills and without reference to such cognitive abilities which seemingly interact with all skill development. It is on the development of such processes that educators, both those who teach and those who do research, must focus future efforts.

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